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Particle-core coupling in deformed nuclei: odd-A and doubly even-A identical bands

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Particle-core coupling is an essential concept in the organization of nuclear data.
All odd and odd-odd nuclei demand such a concept, and broken-pair states in all nuclei require it. Models such as the particle-vibrator (weak-coupling) model and the particle-rotor (strong-coupling) model have been the standard workhorses for organizing large amounts of data. It therefore comes as a surprise to discover that an elementary aspect of the particle-rotor model has been overlooked. Specifically the "rotation-particle"(or "Coriolis") term can be shown to give a universal "alignment"contribution to single-particle (Nilsson) configurations. This differs from, but is similar to "alignment"defined in the cranking model. Organizing data using this insight brings into question long-accepted views of the role of pairing in magnitudes of moments of inertia (there is no odd-particle blocking). The basic ideas will be illustrated and consequences for interpretation of nuclear rotational energies will be made, specifically the partitioning of rotational energy into kinetic and potential energy and connection to the symplectic shell model.

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